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# Foliar Fungicides in Alfalfa Production

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# Foliar Fungicides in Alfalfa Production

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**Summary and Implications**

During the last few years, EPA approved pesticide labels for a few foliar fungicide products for use in alfalfa production. However, university research regarding potential economic benefits of these products is extremely limited. In addition, aggressive salesmanship recommending multiple applications per season raises concerns with proper stewardship for these products to insure long-term effectiveness.

Eight site years of research trials from 2011 through 2013 conducted at the ISU Northeast Research Farm, Nashua found foliar fungicides applications made prior to first crop harvest of established stands are very likely to be profitable due to improved yields and calculated "Milk per Acre". But limited forage testing in these trials showed no significant difference in forage quality measured as "Milk per Ton". Profitability of foliar fungicides applications ahead of second, third or fourth crop harvests was inconsistent and often of minimal value.

**Introduction**

To initiate efforts addressing the potential economic benefits of using foliar fungicides in alfalfa production, we conducted eight site years of research trials from 2011 to 2013 at the ISU Northeast Research Farm, Nashua, Iowa. While additional research is needed for a more complete understanding on the use of foliar fungicides in alfalfa production, the purpose of this report is to provide the preliminary information we have at this time.

**Materials and Methods**

Four trial sites of alfalfa were direct seeded with a Brillion seeder in 2011 and 2012, on land previously in soybeans. The eight site years of foliar fungicide research trials included two trials in the establishment seasons of 2011 and 2012, and in six trials on established stands in 2012 and 2013. The trials had either 4 or 6 replications in a randomized complete block design.

Treatments varied somewhat across the eight trials, but included: (1) Timing of fungicide applications made at either 3 to 4 inches of growth or 6 to 8 inches of growth. (2) Two varieties were compared in 4 of 8 trials. (3) Fungicide applications compared prior to first or second crop for new seedings, and prior to first, second, third, or fourth crop for established stands. A few treatments consisted of multiple applications per season. (4) Comparison of fungicide products, but not all products were compared in all trials. Products included: (a) Headline SC (Group 11); (b) Quadris Flowable (Group 11); (c) Fontelis (Group 7); (d) Champ WG copper hydroxide (Group M).

Disease evaluations were conducted prior to each harvest. Plots were harvested with a self-propelled flail chopper. Dry matter was determined from subsamples collected at harvest and oven dried. For some harvests, composite subsamples were analyzed for forage quality.

Seasonal temperatures and rainfall were near normal from the spring of 2011 through May 2012, after which temperatures were above normal and rainfall was 50% below normal causing a drought through the rest of the 2012 season. In 2013, temperature and rainfall was above normal in spring, then cooler and drier than normal for the rest of the season.

**Results and Discussion**

*New Seedings*

Only Headline SC was used for the new seeding trials. Disease incidence was similar for first and second crop in 2011 and for first crop in 2012, but was notably higher for second crop in 2012. With second crop in both years yielding better than first crop, which is typical for new seedings, the net profitability for a fungicide application was considerably better when applied ahead of second crop rather than ahead of first crop. It is logical to assume that disease presence and its potential impact on a crop would not be as high for first crop since this is a new seeding established on land rotated from a different crop. There would be minimal alfalfa leaf litter to act as a disease inoculums source from which to infect the new stand. By second crop, more alfalfa leaf litter on the ground is likely to act as an inoculums source to potentially contribute to disease infestations.

Since foliar fungicides only protect what they land on, an application at 6 to 8 inches of growth should offer more coverage and protection to alfalfa than for an application at 3 to 4 inches of growth. However, in 2011 and 2012, timing of fungicide applications at either 3 to 4 inches of growth or 6 to 8 inches of growth resulted in no significant differences in disease evaluations or yield responses. Net profit was minimal for a fungicide application ahead of first crop, but for second crop it averaged $21 per acre for Variety 2 and $5 per acre for Variety 1. Both varieties had similar disease incidence ratings, but Variety 2 consistently showed a higher yield response to a foliar fungicide application than for Variety 1. It is reasonable to expect some varieties to respond differently to fungicide applications, however, I think it unreasonable to expect the industry to screen varieties for this potential difference

Forage quality analysis showed little difference between the untreated control and any of the fungicide treatments for either variety or timing of application.

*Established Stands Comparing Two Varieties*

The two fungicide trials on established stands only used Headline SC while comparing two varieties, the 3 to 4-inch versus 6 to 8-inch growth heights, and applications ahead of first, second, third or fourth crops. In both 2011 and 2012 disease pressure for the untreated control was significantly higher for first crop harvest then for second, third or fourth crop harvests. Percent yield response of a fungicide application ahead of first crop harvest for both varieties and both years was twice that of yield responses to applications ahead of the other crop harvests during the season. In turn, net profitability was best for applications ahead of first crop harvest, with an average of $24 per acre for Variety 1 and $44 per acre for Variety 2. Another treatment in these trials was to apply fungicide ahead of both first and third crop harvests. This increased the net profit over the single application ahead of first crop harvest for Variety 2 in 2013, but was not more profitable than for a single application ahead of first crop for Variety 2 in 2012 or for Variety 1 in either year. In general, net profit for fungicides applied ahead of other cuttings was marginal. The average net profit from fungicide applications ahead of second, third and fourth crops for 2012 were $2.50, $3.00, and -$1.00 per acre respectively. The average net profit from fungicide applications ahead of second, third and fourth crops for 2013 were $11.00, $2.00, and -$1.00 per acre respectively.

Timing of fungicide applications at 3 to 4 inches of growth or 6 to 8 inches of growth were only compared with second crop in 2012 and third crop in 2013. In 2012, there was no difference with the timing of applications with regard to disease infestation or yield response for either variety. In 2013, there was a small advantage in yield response for the 6 to 8-inch timing. However, timing an application at 6 to 8 inches of growth ahead of second, third or fourth crop harvests, followed by the required 14 day pre-harvest Interval (PHI), will often find fields starting to flower before the PHI is reached. This could be a problem for those on 30-day cutting intervals. This is not a problem with applications at 6 to 8 inches of growth ahead of first crop harvest.

Composite subsamples from harvested plots of the different treatments were analyzed for forage quality. As with the new seeding trials, in the established stand trials the forage quality analysis showed little difference between the untreated control and any of the fungicide treatments for either variety or timing of application.

*Established Stands Comparing Headline SC, Quadris and Champ WG*

Another trial that was conducted in both 2012 and 2013 compared the fungicides Headline SC, Quadris and Champ WG. In 2012, applications were made ahead of second, third and fourth crop, or just second and fourth crop. In 2013, applications were made ahead of first, second and third crop in 2013. Two varieties were compared in 2012, but only one variety was used in 2013. Unfortunately, we started late in 2012 and missed the opportunity to treat ahead of first crop. In addition, the drought in 2012 significantly affected this trial. Headline SC and Quadris responded similarly to both varieties and in both years. Champ was less affective. In 2012, there was very little yield response to any of the fungicide applications in this trial. Headline SC and Quadris averaged a net profit of $3 per acre when applied ahead of second and fourth crops, but averaged a net loss of -$16 per acre when applied ahead of all three crops. Champ averaged a net loss of -$37 per acre for both timing treatments. Champ provided reductions in disease incidence, but it was not clear as to why that did not correspond to a yield increase. In 2013, with a wet spring, net profits averaged $72 per acre for Headline SC and Quadris applications ahead of first crop, and $24 per acre for Champ applications ahead of first crop. Net profits for applications ahead both second and third crops averaged $8 per acre for Headline SC and Quadris, and net loss of -$28 per acre for Champ.

Proper stewardship of this technology demands chemical families in addition to Group 11 products from which to choose, especially when considering multiple applications of fungicide on the same field in the same season. Unfortunately, in this research the Group M copper hydroxide product did not appear to offer a viable alternative to the Group 11 products of Headline and Quadris.

*Established Stand Comparing Headline SC and Fontelis*

A trial conducted in 2013 compared Headline SC and Fontelis. This trial only encompasses one year and one location, so we must be cautious of our interpretation of the results. In general, the yield response from Headline was better than the yield response from Fontelis for the application ahead of first crop. However, the two products provided similar yield responses for applications ahead of second and third crop harvests. Thus it appears to offer another chemical family to rotate with when applying more than one fungicide application during the season.

*Stewardship*

Just as with the decisions we make to apply fungicides on corn and soybeans, we need to choose our opportunities as to where the probability of economic returns is the most beneficial. To repeatedly apply fungicides to alfalfa without much thought to harvest schedule, environmental conditions, or rotating families of fungicide products is not economically or environmentally sound. The issue of stewardship and fungicide use is critical for long-term viability of this management tool.

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